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MEMORANDUM FOR: Economic Defense Intelligence Committee

FROM : Chairman, EDIC

SUBJECT : The Significance of Sino-Soviet Bloc Imports of Cobalt from the Free World

REFERENCE : EDIC Case No. 25, Secret

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The Significance of Sino-Soviet Bloc Imports of Cobalt from the Free World, Secret, NoForn.

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8 July 1957

THE SIGNIFICANCE OF SINO-SOVIET BLOC IMPORTS OF COBALT FROM THE FREE WORLD

1. Summary

At least 160 tons of cobalt are believed to have been illicitly diverted to the Sino-Soviet Bloc from the free world during 1956. It is probable that almost all of this was destined for the use of the European Satellites.

In 1955 the USSR produced about 1,220 tons of cobalt metal, and no significant amount was produced elsewhere in the Sino-Soviet Bloc.

Cobalt is the only alloying element which is probably in short supply not only in the Bloc as a whole but also in the USSR, itself. It seems unlikely that existing reserves can be exploited at a rate fast enough to overcome this shortage within the next few years.

In the event of full mobilization, certain cobalt requirements, such as for use in aircraft engines or Soviet HVAP (high velocity armor piercing) shells, might increase very rapidly to a point several times current consumption rates. It is not known how large a stockpile may have been built up to take care of such a contingency.

2. Imports in 1956

Some 160 metric tons of cobalt are believed to have reached the Bloc during 1956 by clandestine means. Whereas much of this passed through non-COCOM areas, little, if any, of it is believed to originate outside of COCOM jurisdiction. About 300 kilograms of cobalt were licensed to the Sino-Soviet Bloc by COCOM Participating Countries under exceptions procedures during 1955 and again in 1956. No other authorized shipments are known to have taken place.

3. Supply

a. Reserves

Since World War II, extensive explorations have revealed an estimated reserve of cobalt in the USSR of 50,000 tons. This occurs chiefly in combination with nickel ore.

Small quantities of cobalt ore have been mined in China for many years from a few small deposits. Occasional small shipments of cobalt ore to the European Satellites indicate that some mining is going on now in China.

Some polymetallic deposits in Eastern Europe contain cobalt, but in quantities which are uneconomical to exploit.

b. Production and Imports

The first commercial production of cobalt in the USSR occurred in 1947. Since then, the output has increased steadily until by 1955 it had reached 1,220 metric tons. The USSR had become one of the three largest cobalt producers in the world, in 1955, having produced an amount equivalent to 10 per cent of free world output and one-third of United States consumption.

Outside of the USSR there is no known Bloc production of cobalt in significant quantities.

In recent years Bloc imports from the free world are believed to have been at least as follows (in metric tons):

Year	Licenses Issued by COCOM PC's (Under Exceptions Procedures)
1954	.2
1955	.5
1956	.3

Year	Clandestine Imports
1954	100
1955	30
1956	160

c. Consumption and Exports

It has been estimated that about 330 metric tons of cobalt were consumed by the Sino-Soviet Bloc during the year 1955-56 in the construction of aircraft engines, chiefly in turbine guide vanes and turbine blades of VK-1 jet engines. In addition, perhaps 50-100 tons may have been consumed in Soviet shells.

In 1956-57 Poland is reported to have required about 50 tons of cobalt a year and in 1954 Czechoslovakia imported about 30 tons of cobalt for its own consumption. In East Germany Alnico magnets probably consumed about 18 metric tons of cobalt in 1956.

The Sino-Soviet Bloc is not known to have exported any cobalt to the free-world.

It cannot be estimated how much of the rest of the apparently available 1400 tons of cobalt (some 850-900 tons) was used in other permanent magnets in the communications and radar industries, in high-temperature applications other than in aircraft engines, in binders for sintered carbides, in atomic energy programs, or in lower-priority end-products such as Chinese porcelain, disappearing inks, and paint driers, rather than being placed in strategic stockpiles.

d. Stocks

It is not known how large a stockpile of cobalt the USSR may have acquired. It is inconceivable, however, that the Soviets would not have assembled a reasonably large reserve of this kind, in view of the relatively unsatisfactory results from substitutions for cobalt in some highly strategic end-uses.*

There have been reports that Poland may have been accumulating some small reserve stocks of ferrocobalt.

* For example, a 1956 report indicates that the USSR was shipping cobalt powder to Hungary for use in making armor piercing shells. This indicates that as of that date no satisfactory substitute for cobalt had been developed.

e. Wartime Requirements

As the size and speed of aircraft increases there is a tendency for requirements for high-temperature alloying elements, such as cobalt, to increase. Similarly, any increase in the rate of aircraft output would probably result in a corresponding increase in requirements for cobalt. It has been estimated that nearly 1500 metric tons of cobalt might be required for one year's capacity-production of aircraft engines by the Soviet Bloc.

Under full mobilization, direct military requirements for Soviet armor piercing shells might quickly increase the need for cobalt in this use to many times the peacetime level.

f. Evidences of Shortage

Soviet expenditures for military purposes are estimated to be approximately equal to those of the United States. Thus a Soviet supply of cobalt equal to only one-third of the amount used by the United States for current consumption (that is, exclusive of amounts set aside by the U.S. for stockpiling), could be adequate for no more than uses of the highest priority.

In East Germany Alnico magnets have been said to require 24.8 tons of cobalt in 1956 and 40 tons in 1957 to produce 300,000 magnets, half of East German requirements for such magnets. Yet, only 18 tons of cobalt had been allocated by October 1956, says this report, and only 17 tons were expected in 1957.

The occasional references to cobalt in Soviet technical literature usually are made in connection with the development of substitutes for it. Sintered tungsten carbide cores of Soviet HVAP shells recovered in Korea used nickel to replace cobalt in the binder, a substitution which reduces the effectiveness of the missile.

The main consumption of cobalt in U.S. reciprocating engines is in the alloys used in valve seat facings and valve tips. Materials analysis of the valves from the Soviet ASH-62 aircraft engine indicated an absence of cobalt. The valve tip used by the Wright Aeronautical Corporation contains some 3 percent cobalt.

Soviet researchers are now working toward the development of chrome-based high-temperature alloys and ceramic tool bits, partly to reduce requirements for cobalt.

Substitution by European Satellites, particularly East Germany, of inferior materials for cobalt, and the devious and costly attempts of the Satellites to relieve their chronic cobalt shortage by covert importation from the free world, clearly indicate that Soviet shipments to the Satellites are severely restricted.